Math 33B Homework 1 Due Friday, July 1, 2022

Do the following problems from each section of the textbook.

- 2.1: 16,20
- 2.2: 14,18
- 2.4: 16,20,25,40
- 2.5: 6 (This problem has a typo: use rate in = 2 gal/min and rate out = 3 gal/min.)
- 2.6: 10,20,26,38,40,44

Do the following additional problems.

- 1. Find the general solution to $\frac{1}{y-y^2}y' = te^t$.
- 2. A reasonable way to model outside temperate fluctuations throughout the day is with a sinusoidal function. Let's assume the weather in Los Angeles varies sinusoidally with period 24 hours. Assume that the daily maximum temperature is 80°F and happens at 2 pm, and the daily minimum temperature is 64° F and happens at 2 am.
 - (a) Let A(t) denote the outside temperature in Los Angeles at time t, with t = 0 corresponding to midnight. Write down an explicit formula for A(t). (Your model should be of the form $A(t) = C \sin(\pi t/12) + D$ for some numbers C and D).
 - (b) At 2 pm, you leave a 50° F glass of water outside. Let T(t) denote the temperature of the glass of water at time t, with t = 0 corresponding to midnight. According to Newton's law of cooling, we have

$$\frac{dT}{dt} = -.03(T - A).$$

Using the methods of section 2.4, find an explicit formula for T(t).